

CLAIMS

What is claimed is:

1. A method of surveilling a subject, the subject including a person and any discernable objects with the person, the method comprising:

transmitting toward the subject in a subject position, electromagnetic radiation in a frequency range of about 100 MHz to about 2 THz, from positions spaced from the subject position;

receiving from the subject electromagnetic radiation emitted from the subject in response to the transmitted electromagnetic radiation;

producing an image signal representative of the received radiation;

producing from the image signal, image data corresponding to a first image of at least a portion of the subject;

determining whether the image data corresponding to the first image includes characteristics corresponding to an object on the person; and

when the image data corresponding to the first image is determined to include characteristics corresponding to an object, determining the location in the first image corresponding to image data including characteristics corresponding to an object.

2. The method of claim 1, further comprising producing from the image signal associated with the image data including characteristics corresponding to an object, image data corresponding to a second image of at least a portion the first image including the location corresponding to image data including characteristics corresponding to an object.

3. The method of claim 1, in which transmitting radiation includes transmitting radiation on a first antenna apparatus and transmitting radiation from a second antenna apparatus; receiving radiation includes receiving radiation on the first antenna apparatus in response to radiation transmitted on the first antenna apparatus, and receiving radiation on the second antenna apparatus in response to radiation transmitted on the second antenna apparatus; and producing an image signal includes producing the first portion of the image signal representative of the radiation received on the first antenna apparatus, and producing the second portion of the image signal representative of the radiation received on the second antenna apparatus.

4. The method of claim 1, in which producing image data corresponding to a first image includes producing image data having picture elements with different levels of intensity, and determining whether the image data corresponding to the first image includes characteristics corresponding to an object includes determining a correlation of the levels of intensity of at least one group of picture elements with the levels of intensity of a corresponding reference group of picture elements.

5. The method of claim 4, in which determining a correlation of the levels of intensity further includes identifying at least a portion of the image data corresponding to which there is at least a threshold correlation of the levels of intensity of the picture elements in the at least one group of picture elements with the levels of intensity of the picture elements in the reference group of picture elements.

6. The method of claim 5, in which identifying at least a portion of the image data includes determining a correlation value of a given picture element as a function of the intensity level of one or more other picture elements.

7. The method of claim 6, in which determining a correlation value of a given picture element includes determining a correlation value for the given picture element that is derived from the intensity levels of a group of associated picture elements arranged relative to the given picture element.

8. The method of claim 7, in which determining the correlation value of the given picture element derived from the intensity levels of an associated group of picture elements includes modifying the original intensity level of each picture element of the group of associated picture elements, by an amount related to the position of the picture element in the group relative to the given element, and combining the modified intensity levels.

9. The method of claim 8, in which modifying the original intensity level includes associating a factor with each picture-element in the group of picture-elements, with at least two of the factors being different, and multiplying the original intensity level of each picture element in the group by the factor associated with the picture element.

10. The method of claim 9, in which associating a factor includes associating a factor with each picture element in a group of adjacent picture-element positions including a center picture-element position, with the factor associated with the center picture-element position having a value greater than the value of the other factors.

11. The method of claim 10, in which associating a factor includes associating a factor with each picture element in a group of adjacent picture-element positions forming at least one row of picture-element positions, with the factors of the picture-element positions in the at least one row including at least one positive value and at least one negative value.

12. The method of claim 11, in which associating a factor includes associating a factor with each picture element in a group of adjacent picture-element positions forming a grid of columns and rows of picture-element positions, with the factors of the picture-element positions in each row and column alternating between positive and negative values.

13. The method of claim 1, further comprising:
displaying a third image representative of at least a portion of the subject corresponding to the location of the object, the third image including at least a portion of the second image and a fourth image, the fourth image including at least a portion of the subject adjacent to the portion of the subject corresponding to the location of the object and having a lower resolution than the first image.

14. The method of claim 13, further comprising displaying third images for different orientations of the subject.

15. The method of claim 14, in which displaying the third images includes displaying the third images in time sequence.

16. The method of claim 15, in which displaying the third images includes displaying the third images in a manner visually perceived as a rotating image.

17. The method of claim 14, further comprising selecting the number of third images to be displayed.

18. An imaging system comprising:

means for transmitting toward a subject in a subject position, the subject including a person and any discernable objects with the person, electromagnetic radiation in a frequency range of about 100 MHz to about 2 THz, from positions spaced from the subject position;

means for receiving from the subject electromagnetic radiation emitted from the subject in response to the transmitted electromagnetic radiation;

means for producing an image signal representative of the received radiation;

means for producing from the image signal, image data corresponding to a first image of at least a portion of the subject;

means for determining whether the image data corresponding to the first image includes characteristics corresponding to an object on the person; and

means for producing from the image signal associated with the image data including characteristics corresponding to an object, image data corresponding to a second image of at least a portion the first image, when the image data corresponding to the first image is determined to include characteristics corresponding to an object.

19. A method comprising:

interrogating a subject, including a person and any objects carried by the person, with electromagnetic radiation in a range of about 100 MHz to about 2 THz;

generating, from the interrogating, first image data representative of a first image of at least a portion of the subject;

identifying at least a first portion of the first image data having characteristics corresponding to characteristics of an object carried by the person; and

displaying a second image representative of the first portion of the first image data.

20. The method of claim 19, in which generating first image data includes generating first image data having picture elements with different levels of intensity, and identifying at least a first portion of the first image data includes determining a correlation of the levels of intensity of at least one group of picture elements with the levels of intensity of a corresponding reference group of picture elements.

21. The method of claim 20, in which determining a correlation of the levels of intensity further includes identifying at least a portion of the first image data corresponding to which there is at least a threshold correlation of the levels of intensity of the picture elements in the at least one group of picture elements with the levels of intensity of the reference group of picture elements.

22. The method of claim 21, in which identifying at least a portion of the first image data includes determining a correlation value for a given picture element as a function of the intensity level of one or more other picture elements.

23. The method of claim 22, in which determining a correlation value for a given picture element includes determining a correlation value for the given picture element that is derived from the intensity levels of a group of associated picture elements arranged relative to the given picture element.

24. The method of claim 23, in which determining the correlation value for the given picture element derived from the intensity levels of an associated group of picture elements includes modifying the original intensity level of each picture element of the group of associated picture elements, by an amount related to the position of the picture element in the group relative to the given element, and combining the modified intensity levels.

25. The method of claim 24, in which modifying the original intensity level includes associating a factor with each picture-element in the group of picture-elements, with at least two of the factors being different, and multiplying the original intensity level of each picture element in the group by the factor associated with the picture element.

26. The method of claim 25, in which associating a factor includes associating a factor with each picture element in a group of adjacent picture-element positions including a center picture-element position, with the factor associated with the center picture-element position having a value greater than the value of the other factors.

27. The method of claim 25, in which associating a factor includes associating a factor with each picture element in a group of adjacent picture-element positions forming at least one row of picture-element positions, with the factors of the picture-element position in the at least one row including at least one positive value and at least one negative value.

28. The method of claim 25, in which associating a factor includes associating a factor with each picture element in a group of adjacent picture-element positions forming a grid of columns and rows of picture-element positions, with the factors of the picture-element positions in each row and column alternating between positive and negative values.

29. The method of claim 19, wherein displaying a second image includes displaying a third image including the second image and a fourth image, the fourth image including at least a portion of the subject adjacent to the portion of the subject corresponding to the location of the object and having a lower resolution than the first image.

30. The method of claim 29, further comprising displaying third images for different orientations of the subject.

31. The method of claim 30, in which displaying the third images includes displaying the third images in time sequence.

32. The method of claim 15, in which displaying the third images includes displaying the third images in a manner visually perceived as a rotating image.

33. The method of claim 14, further comprising selecting the number of third images to be displayed.

34. An imaging system comprising:
an antenna assembly including at least a first antenna apparatus, each antenna apparatus configured to transmit toward and receive from a subject, including a person and any discernable objects with the person, in a subject position, electromagnetic radiation in a frequency range of about 100 MHz to about 2 THz, from positions spaced from the subject position, the antenna assembly producing an image signal representative of the received radiation; and

a controller adapted to produce from at least a first portion of the image signal first image data corresponding to a first image of at least a portion of the subject, and to identify at least a first portion of the first image data having characteristics corresponding to characteristics of an object carried by the person.

35. The system of claim 34, in which the controller is further adapted to generate first image data having picture elements with different levels of intensity, and to determine a correlation of the levels of intensity of at least one group of picture elements with the levels of intensity of a corresponding reference group of picture elements.

36. The system of claim 34, in which the controller is further adapted to identify at least a portion of the first image data corresponding to which there is at least a threshold correlation of the levels of intensity of the picture elements in the at least one group of picture elements with the levels of intensity of the reference group of picture elements.

37. The system of claim 34, further comprising a display device coupled to the controller, and wherein the controller is further adapted to display a second image including at least the portion of the first image and a third image, the third image including at least a portion of the subject adjacent to the portion of the first image and having a lower resolution than the first image.

38. The system of claim 37, in which the controller is further adapted to display a third image for each of a plurality of different orientations of the subject.

39. The system of claim 38, in which the controller is further adapted to display the third images in time sequence.

40. The system of claim 39, in which the controller is further adapted to display the third images in a manner visually perceived as a rotating image.

41. The system of claim 38, in which the controller is further adapted allow a user to select the number of third images to be displayed.

42. An imaging system comprising:
means for interrogating a subject, including a person and any objects carried by the person, with electromagnetic radiation in a range of about 100 MHz to about 2 THz;
means coupled to the means for interrogating for generating first image data representative of a first image of at least a portion of the interrogated subject; and
means for identifying at least a first portion of the first image data having characteristics corresponding to characteristics of an object carried by the person.

43. One or more storage media having embodied therein a program of commands adapted to be executed by a computer processor to:

receive an image signal generated in response to an interrogation of a subject, including a person and any objects carried by the person, with electromagnetic radiation in a range of about 100 MHz to about 2 THz;

produce from the image signal, first image data representative of a first image of at least a portion of the subject; and

identifying at least a first portion of the first image data having characteristics corresponding to characteristics of an object carried by the person.

44. The storage media of claim 43, in which the program embodied therein is further adapted to be executed by a computer processor to generate first image data having picture elements with different levels of intensity, and to identify at least a first portion of the first image data by determining a correlation of the levels of intensity of at least one group of picture elements with the levels of intensity of a corresponding reference group of picture elements.

45. The storage media of claim 44, in which the program embodied therein is further adapted to be executed by a computer processor to determine a correlation of the levels of intensity by identifying at least a portion of the first image data corresponding to which there is at least a threshold correlation of the levels of intensity of the picture elements in the at least one group of picture elements, with the levels of intensity of the reference group of picture elements.